

FRUNZE, T.M.; KORSHAK, V.V.; PETROVA, V.F.

Heterochain polyamides. Part 15: Polyamides of hydroaromatic acids. Vysokom. soed. 1 no.3:349-356 Mr '59.

(MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.  
(Amides) (Hydroaromatic compounds)

FRUNZE, T.M.; KORSHAK, V.V.; ANDREYEV, D.N.; KUKHARSKAYA, E.V.

Heterochain polyamides. Part 16: Polyamides containing siloxane groups in the main chain. Vysokom.soad. 1 no.4:489-494  
Ap '59. (MIRA 12:9)

1. Institut elementoorganicheskikh soyedineniy An SSSR, i Institut khimii silikatov AN SSSR.  
(Amides)

FRUNZE, T.M.; KORSHAK, V.V.; KRASNYANSKAYA, E.A.

Heterochain polyamides. Part 17: Polyamides made from p-xylenediamine. Vysokom.soed. 1 no.4:495-499 Ap '59.  
(MIRA 12:9)

1. Institut elementoorganicheskikh soedineniy AN SSSR.  
(Amides): (Phenylenediamine)

FRUNZE, T.M.; KORSHAK, V.V.; MAKARKIN, V.A.

Heterochain polyamides. Part 18: Obtaining mixed polyamides  
by melting homogeneous polyamides. *Vysokom.soad.* 1 no.4:500-505  
Ap '59. (MIRA 12:9)

1. Institut elementoorganicheskikh soedineniy AN SSSR.  
(Amides)

FRUNZE, T.M.; KORSHAK, V.V.; ROMANOVA, Z.V.

Heterochain polyamides. Part 19: Polyamides obtained from cis- and trans-isomers of 1,3-diaminocyclohexane and aliphatic dicarboxylic acids. Vysokom.soed. 1 no.4:518-525 Ap '59.

(MIRA 12:9)

1. Institut elementoorganicheskikh soedineniy AN SSSR.  
(Amides) (Cyclohexanediamine) (Acids)

SLONIMSKIY, G.L.; FRUNZE, T.M.; KORSHAK, V.V.; ROGOVINA, L.Z.

Effect of the composition of mixed polyamides on their phase state. Vysokom.sped. 1 no.4:526-529 Ap '59. (MIRA 12:9)

1. Institut elementoorganicheskikh soedineniy AN SSSR.  
(Amides) (Phase rule and equilibrium)

SLONIMSKIY, G.L.; FRUNZE, T.M.; KORSHAK, V.V.; ROMANOVA, Z.V.; ROGOVINA, L.Z.

Thermomechanical study of polyamides made from cis- and trans-isomers of diaminocyclohexane and aliphatic dicarboxylic acids. Vysokom.sped. 1 no.4:530-533 Ap '59. (MIRA 12:9)

1. Institut elementoorganicheskikh soedineniy AN SSSR.  
(Amides) (Cyclohexanediamine) (Acids)

FRUNZE, T.M.; KORSHAK, V.V.; KURASHEV, V.V.

Phosphorous organic polymers. Part 6: Polyamides of some phosphorus-containing dicarboxylic acids. Vysokom.sped. 1 no.5:670-676  
My '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soedineniy AN SSSR.  
(Amides) (Acids, Organic)



FRUNZE, T.M.; KORSHAK, V.V.; KOZLOV, L.V.; KURASHEV, V.V.

Phosphorous organic polymers. Part 7: Mixed phosphorus-containing polyamides. Vysokom.sped. 1 no.5:677-681 My '59.  
(MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.  
(Amides)

FRUNZE, T.M.; KORSHAK, V.V.

Heterochain polyamides. Part 21: Structural dependence of the melting temperature in homologous series of heterochain polymers. Vysokom. soed. 1 no.6:809-818 Je '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soedineniy AN SSSR.  
(Amides) (Polymers)

FRUNZE, T.M.; KORSHAK, V.V.; KURASHEV, V.V.; ALIYEVSKIY, P.A.

Heterochain polyamides. Part 22: Effect of certain factors on the process of formation of the polyamide in a two-phase system. Vysokom.sped. 1 no.12:1795-1800 D '59.  
(MIRA 13:5)

1. Institut elementoorganicheskikh soedineniy AN SSSR.  
(Polyamides)

5(3)

AUTHORS:

Frunze, T. M., Korshak, V. V.,  
Kozlov, L. V.

SOV/62-59-3-23/37

TITLE:

Investigations in the Field of the Polyamides With Heterogeneous  
Chains (Iz oblasti geterotsoprykh poliamidov). Communication 9.  
Production of Polyamides and Polyamido Esters From Bis-  
Oxazolones (Sobshcheniya 9. Polucheniya poliamidov i  
poliamidoestirov iz bisokazolona)

PERIODICAL:

Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk,  
1959, Nr 3, pp 535-539 (USSR)

ABSTRACT:

In the present paper polyamides and polyamido esters were  
synthesized. Bis-oxazolones were used as initial products. In  
order to obtain these bis-oxazolones dicarboxylic acids such as  
the terephthalic and sebacic acid were used. These acids are  
transformed under the action of phosphorus pentachloride or  
thionyl chloride into the corresponding diacid chlorides. In  
the reaction of the latter with a solution of alkali or amino  
acid N-N'-acyl-bis-( $\alpha$ -amino acids)(Table 1) is formed. By  
heating these acids with acetic anhydride according to the  
method described in reference 1 bis-oxazolones were obtained  
(Table 1). Polyamides and polyamido esters formed due to

Card 1/3

Investigations in the Field of the Polyamides With SOV/62-59-3-23/37  
Heterogeneous Chains. Communication 9. Production of Polyamides and  
Polyamido Esters From Bis-Oxazolones

the action of bis-oxazolones on diamines, amino alcohols or glycols in the solvent. Reaction temperature was not higher than 60°. The duration of reaction depends on the nature of the initial substances. Diamines react the most rapidly (5-14 hours), glycols and amino alcohols more slowly. E.g. the reaction of ethylene glycol or monoethanolamine takes up to 146 hours. Pyridine or chloroform were used as solvents. The polyamides obtained are solid, powdery, white substances. They are well soluble in cresol, insoluble in chloroform and benzene. The polyamido ester obtained from ethylene glycol which is well soluble in chloroform is an exception. The properties of the products obtained are given in table 2. The polyamides which were obtained from the reaction of bis-oxazolones with diamines and glycols and which have a regular structure have higher melting temperatures than the polyamides which were obtained by means of direct polycondensation and in which the residues of the initial products are irregularly distributed. In the case of a polymer with regular structure the substitution of octamethylene by the phenylene group leads to a greater

Card 2/3

Investigations in the Field of the Polyamides With Heterogeneous Chains. Communication 9. Production of Polyamides and Polyamido Esters From Bis-Oxazolones

SOV/62-59-3-23/37

increase of the melting temperature than is the case with polymers with a macromolecule of irregular structure. The degree of crystallization was determined by Yu. S. Struchkov in the laboratoriya rentgenostruktural'nogo analiza (Laboratory for X-Ray Structural Analysis). The thermomechanical curves were recorded by L. Z. Rogovina in the laboratoriya issledovaniya polimerov (Laboratory for the Investigation of Polymers). The authors express their thanks for the investigations carried out. There are 1 figure, 2 tables, and 3 references, 2 of which are Soviet.

ASSOCIATION: Institut elementoorganicheskikh soedineniy Akademii nauk SSSR (Institute of Elemental Organic Compounds of the Academy of Sciences, USSR)

SUBMITTED: June 13, 1957

Card 3/3

5 (3)

AUTHORS:

Korshak, V. V., Corresponding Member SOV/20-126-6-35/67  
AS USSR, Erunze, T. M., Kurashev, V. V.,  
Alybina, A. Yu.

TITLE:

On Some Characteristic Features of the Non-equilibrium Polycondensation (O nekotorykh osobennostyakh neravnovesnoy polikondensatsii)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 6, pp 1270 - 1273 (USSR)

ABSTRACT:

This paper, the experimental part of which was worked out with the assistance of P. A. Aliyevskiy gives only part of the results obtained. A detailed description will be published later. The equilibrium polycondensation (Ref 1) which takes place under the interaction of diamines (Ref 1) is characterized by several characteristic features among them by the reversibility both of the main reaction of the polymer synthesis (see scheme) as well as the accompanying conversions (of the exchange reactions) which take place simultaneously (Ref 2). Such exchange reactions, which have mostly destructive character, take place between the growing polyamide molecules at the expense of the end groups as well as of the amide bonds in the macromolecule

Card 1/4

On Some Characteristic Features of the Non-equilibrium SOV/20-126-6-35/67  
Polycondensation

(Ref 3). They bring about a certain, rather close distribution of the forming polymer according to the specific weights (Ref 4). The exchange reactions lead to the fact that in the equilibrium polycondensation a state occurs which is denoted as "polycondensation equilibrium" (Ref 5). The excess of one of the reaction products disturbs this equilibrium and influences the molecular weight of the formed product (Ref 6, Fig 2). The present investigation was carried out in order to determine whether these dependences change if the polycondensation is carried out as a non-equilibrium process. As an example of such a reaction the interaction between dicarboxylic acid chlorides with diamines may be used (see scheme). If this reaction is carried out at the boundary between two phases by dissolving the initial substances in two liquids which do not mix with each other (Ref 7), then it takes place very rapidly also at low temperatures i.e. under conditions at which no counter reactions occur. The authors investigated the reaction between hexamethylene diamine with alkali addition and adipinic acid chloride. It may be seen from figure 1 that the optimum concentration which leads to high yields in the production of

Card 2/4



On Some Characteristic Features of the Non-equilibrium SOV/20-126-6-35/67  
Polycondensation

high-molecular products is the 0.15 mol/l solution. Both reagents were solutions of the same concentration. In order to solve the problem of the effect of the ratio of the initial substance on the molecular weight of the forming polymers a test series was carried out in which either the one or the other initial substance formed an excess. In spite of large excesses the obtained polyamides had practically no equal molecular weights (Table 1). In the case of an equilibrium polycondensation, in the reaction of dicarboxylic acids with diamines (Fig 2) this excess produces strong effects. In this case, the factor which interrupts the reaction and the growth of the chain is the formation of a polyamide film on the separation surface of the phases through which the initial reagents may not diffuse. An addition of butyric acid chloride to the solution of the initial acid chloride in benzene considerably reduces the molecular weight of the forming polyamide (Figs 3 and 4). A polymer, which has groups incapable of reaction, at the two ends, looses the capability of a further growth. There are 4 figures, 1 table, and 7 references, 6 of which are Soviet.

Card 3/4

On Some Characteristic Features of the Non-equilibrium Polycondensation SOV/20-126-6-35/67

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR  
(Institute of Elemental-organic Compounds of the Academy of  
Sciences, USSR)

SUBMITTED: April 17, 1959

Card 4/4

83811

15.8114 also 2209

S/190/60/002/005/001/015  
B004/B067

AUTHORS: Korshak, V. V., Frunze, T. M., Kurashev, V. V.

TITLE: From the Field of the Heterochain Polyamides. XXIII. Polycondensation of the Oxide of Bis-(p-carboxyphenyl)phenylphosphinyldichloride With Hexamethylenediamine in the Interface

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 5, pp. 633-635

TEXT: In earlier papers (Refs. 1-3) the authors studied the polycondensation of phosphorous polyamides with aliphatic and aromatic diamines in the melt. The present paper describes the polycondensation of the oxide of bis-(p-carboxyphenyl)phenylphosphinyldichloride in the interface. The authors found that by mixing a solution of the phosphorus compound in benzene with a solution of hexamethylenediamine and KOH in water, a polyamide film is formed in the interface, which may be extracted as a continuous twist. In mixing the solutions the polyamide was precipitated as a white powder. The yield was 72 - 92%. The relative viscosity was determined at 20°C in tricresol. A figure shows the relative viscosity as

Card 1/2

83811

From the Field of the Heterochain Polyamides. S/190/60/002/005/001/015  
 XXIII. Polycondensation of the Oxide of B004/B067  
 Bis-(p-carboxyphenyl)phenylphosphinyldichloride  
 With Hexamethylenediamine in the Interface

a function of the initial concentration of the reagents. A maximum value of about 0.88 was attained at 0.01 mole/l. At higher concentrations viscosity increased. Table 1 compares the polymers obtained in the melt (relative viscosity = 0.42, tensile strength 530 kg/cm<sup>2</sup>) with those obtained in the interface (relative viscosity = 0.88, tensile strength = 700 kg/cm<sup>2</sup>). Table 2 presents yields and viscosities of the polyamides as a function of the concentration of the reagents. The viscosity decrease with rising concentration is explained by a premature chain rupture due to hydrolysis of the terminal acid chloride groups. There are 1 figure, 2 tables, and 6 references: 5 Soviet, 2 US, and 1 British.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy AN SSSR  
 (Institute of Elemental-organic Compounds of the AS USSR)

SUBMITTED: December 18, 1959

Card 2/2

83815

15.8114 also 2209

S/190/60/002/005/005/015  
B004/B067

AUTHORS: Korshak, V. V., Frunze, T. M., Kozlov, L. V.,  
Alybina, A. Yu. ~~XXXXXXXXXXXX~~

TITLE: From the Field of Heterochain Polyamides. XXIV. Production  
of Mixed Polyamides in the Interface

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 5,  
pp. 673-678

TEXT: The authors of the present paper wanted to synthesize mixed polyamides by means of non-equilibrium polycondensation in the interface, and to study the influence exerted by the reactivity of the initial substances on the composition of the polyamides. A mixture of 0.2 mole solutions of adipyl chloride and isophthalyl chloride in benzene was mixed with a 0.4 mole solution of hexamethylene diamine in aqueous KOH with 1000 rpm. For comparison, the same polyamides were produced by equilibrium polycondensation, by heating the initial substances to 210 - 270°C in nitrogen current. Table 1 gives viscosity, solubility in formic acid, flowing point, and, on the basis of the infrared spectra

Card 1/3

From the Field of Heterochain Polyamides.  
XXIV. Production of Mixed Polyamides in the  
Interface

83815  
S/190/60/002/005/005/015  
B004/B067

shown in Fig. 2, the degree of crystallization. While the polymer of hexamethylenesophthalimide is insoluble in formic acid, mixed polymers with a content of 60% isophthalic acid were completely soluble in formic acid (Fig. 1). The formation of a single copolymer was proven by the infrared spectrum. The products obtained by equilibrium polycondensation had a higher flowing point than the products synthesized in the interface (Fig. 3), and had also a higher degree of crystallization. In the reaction of adipyl chloride and isoterephthalyl chloride with hexamethylene diamine in the interface, with the polymer being extracted from the interface as a film, the individual film samples taken during the reaction showed a perfectly homogeneous structure (Table 2) inspite of different reactivity. The different reactivity of adipyl chloride, sebacyl chloride, and azelalyl chloride had no influence on the physical properties of the copolymers with hexamethylene diamine (Table 3) obtained from varying mixtures of these acid chlorides. The authors thank the laboratory heads of their institute: I. V. Obreimov (Optical Laboratory), A. I. Kitaygerodskiy (Laboratory for X-Ray Structural Analysis), and G. L. Slonimskiy (Laboratory for the Investigation of Polymers) for their investigations.

Card 2/3

83815

From the Field of Heterochain Polyamides.  
XXIV. Production of Mixed Polyamides in the  
Interface

S/190/60/002/005/005/015  
B004/B067

L. V. Zhironva took part in the experimental work. There are 3 figures,  
5 tables, and 9 references: 6 Soviet, 2 US, and 1 British.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy AN SSSR  
(Institute of Elemental-organic Compounds of the AS USSR)

SUBMITTED: January 9, 1960

Card 3/3

83698

S/190/60/002/006/002/012  
B015/B064

15-8107 *aka* 2209

AUTHORS: Korshak, V. V., Frunze, T. M., Kozlov, I. V.

TITLE: On the Heterochain Polyamides XXV. Synthesis of Polyamides  
Containing Piperazine Radicals on the Interface

PERIODICAL: <sup>1</sup>Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No 6,  
pp. 838-844

TEXT: Simple and mixed polyamides were produced from piperazine with adipyl-, azelal-, sebacyl-, phthalyl-, isophthalyl-, and terephthalyl chloride, as well as from ethylene-, hexamethylene-, and nonamethylene amine with sebacyl chloride by the method of interface polycondensation, and their properties investigated. The chlorides were applied as 0.2 M solutions in benzene and the diamines as 0.2 M solutions in water (prepared from 0.4 M solutions in KOH). The polymer yield was 30-50%. Tables 1 and 2 give the properties of the polyamides obtained and show that a reduction in length of the methylene chain of the dicarboxylic acids leads to an increase in the flow temperature. Polyamides containing piperazine (except for polypiperazine terephthalamide) are better soluble

Card 1/3



83698

On the Heterochain Polyamides. XXV. Synthesis of Polyamides Containing Piperazine Radicals on the Interface S/190/60/002/006/002/012  
BO15/BO64

in organic solvents than polyamides obtained from the same acids with aliphatic diamines. Tables 3-5 list the properties of the mixed polyamides and show that a change in the piperazine content exerts a considerable influence upon flow temperature, solubility, and mechanical properties. Flow temperature and solubility of the polyamides obtained from piperazine and aromatic dicarboxylic acids depends on the position of the carboxyl groups in the cycle. An introduction of 20 mole% of aliphatic diamine radicals into polypiperazine sebacinamide leads to a reduction of the flow temperature. A further increase in the radical content causes an increase in flow temperature and a reduction of the solubility of the mixed polyamides. Studies on the influence of the varying reactivity of the initial diamines upon the structure and properties of the mixed polyamides obtained, showed (Table 6, composition, softening- and flow temperature, viscosity 0.5% solutions in tricresol at 20°C), that there are no essential differences in the properties of the products obtained. L. V. Zhirona took part in experimenting. There are 1 figure, 6 tables, and 7 references: 1 Soviet, 4 US, 1 German, and 1 French.

Card 2/3

83698

On the Heterochain Polyamides, XXV. Synthesis  
of Polyamides Containing Piperazine Radicals on the Interface

S/190/60/002/006/002/012  
B015/B064

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR  
(Institute of Elemental-organic Compounds of the AS USSR)

SUBMITTED: February 1, 1960

Card 3/3

83699

S/190/60/002/006/003/012  
B015/B064

15.8107 also 2209

AUTHORS: Korshak, V. V., Frunze, T. M., Kozlov, L. V.

TITLE: From the Field of the Heterochains Polyamides. XXVI. Mixed Polyamides of Piperazine With Aliphatic and Aromatic Dicarboxylic Acids <sup>1</sup>

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 6, pp. 845-850

TEXT: In continuation of an experimental series (Ref. 1) mixed polyamides were produced by the method of the interfacial polycondensation from piperazine and adipyl-, azeloyl-, phthalyl-, isophthalyl-, and terephthalyl chloride. The chlorides were used as 0.2 M solutions in benzene and piperazine as 0.2 M solution in water (produced from 0.4 M solution in KOH). For the copolymers obtained, the specific viscosity of a 0.5% solution was determined in 95%  $H_2SO_4$  at 20°C, as well as the flow tempera-

ture and solubility in organic solvents (results on Tables 1-3). The introduction of the aliphatic dicarboxylic acid radicals into the polyamide reduced essentially the flow temperature of the polymer. The

Card 1/2

83699

From the Field of the Heterochains Polyamides.  
XXVI. Mixed Polyamides of Piperazine With  
Aliphatic and Aromatic Dicarboxylic Acids

S/190/60/002/006/003/012  
B015/B064

position of the carboxyl groups in the radical of the aromatic dicarboxylic acids in the mixed polyamides has the usual effect upon the flow temperature, i.e. the mixed polyamides with a paraphenyl cycle have the highest flow temperature. The polyamides obtained from piperazine are in organic solvents better soluble than those obtained from aliphatic diamines. The mixed polyamides obtained from piperazine, and azelalyl-, phthalyl-, and isophthalyl chloride dissolve best in polar organic solvents. L.V. Zhigova took part in experimenting. There are 1 figure, 3 tables, and 5 references: 1 Soviet and 2 US. ✓

ASSOCIATION: Institut elementoorganicheskikh sovedineniy AN SSSR  
(Institute of Elemental-organic Compounds of the AS USSR)

SUBMITTED: February 1, 1960

Card 2/2

KORSHAK, V.V.; FRUNZE, T.M.; LU I-HAN' [Lu I-nan]

Heterochain polyamides. Part 27: Synthesis of mixed polyamides  
from homopolyamides. Vysokom.sosd. 2 no.7:984-988 J1 '60.  
(MIRA 13'8)

1. Institut elementoorganicheskikh soedineniy AN SSSR.  
(Polyamides)

87022

S/190/60/002/007/001/017  
B020/B052

158107

AUTHORS: Korshak, V. V., Frunze, T. M., Lu I-nan'  
TITLE: On Heterochain Polyamides. XXVII. The Production of Mixed Polyamides From Homopolyamides  
PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 7, pp. 984-988

TEXT: The formation kinetics of mixed polyamides by copolycondensation of two or more initial substances was investigated by V. M. Kharitonov and two of the authors (Ref. 4). It was the purpose of the present paper to investigate the reaction course with time of the production of a series of mixed polyamides from the homogeneous polyamides concerned. Table 1 gives the properties of the initial homopolymers which were produced by polycondensation of hexamethylene diamine salts with adipic, azelaic, or sebacic acids in the melt, and also by polymerization of  $\epsilon$ -caprolactam in the presence of 2% hexamethylene diammonium adipate (AH salt). The melting points and specific viscosity of 0.5% solutions of mixed polyamides in cresol at 20°C and the mechanical properties of some of the polymers

Card 1/3

87022

On Heterochain Polyamides. XXVII. The Production of Mixed Polyamides From Homopolyamides S/190/60/002/007/001/017  
B020/B052

were determined, X-ray pictures were taken and thermomechanical curves were plotted. Some of the data obtained are given in Tables 2 and 3. Heating of the polyamide melts changes their flowing point and the viscosity of their solutions. Fig. 1 shows that the specific viscosity of the solutions and the molecular weight of the polymers are increased by heating. Table 3 gives some mechanical properties of the polyamides in the system polyhexamethylene adipamide - poly-ε-capronamide. The data of this table and Fig. 2 show that the tenacity of the polyamides decreases with the time of heating, i.e., the development of block and mixed polymers causes a reduction of their tenacity, whereas the elongation at break is increased. Fig. 3 shows the shift of the flow point due to heating: it becomes lower as the time of heating is increased. Fig. 4 gives the change in the reaction mass composition caused by heating. It was observed that the block polymer for a comparatively long period is the chief constituent of the reaction mass. There are 4 figures, 3 tables, and 8 references: 6 Soviet, 1 German, and 1 British.

Card 2/3

87022

On Heterochain Polyamides. XXVII. The Production S/190/60/002/007/001/017  
of Mixed Polyamides From Homopolyamides B020/B052

ASSOCIATION: Institut elementoorganicheskikh soyedineniy AN SSSR  
(Institute of Elemental-organic Compounds of the AS USSR)

SUBMITTED: February 16, 1960

✓

Card 3/3



KORSHAK, V.V.; FRUNZE, T.M.; KURASHEV, V.V.; SEROVA, K.L.

Heterochain polyamides. Part 28: Significance of acceptors of hydrochloric acid in the synthesis of polyamides by interfacial polycondensation. Vysokom. soed, 3 no.2:205-207 F '61.

(MIRA 14:5)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.  
(Polyamides)

KORSHAK, V.V.; FRUNZE, T.M.; VINOGRADOVA, S.V.; KURASHEV, V.V.; LEBEDEVA, A.S.

Heterochain polyamides. Part 29: Significance of the hydrolysis of dichlorides of dicarboxylic acids during interphase polycondensation. Vysokom.sped. 3 no.3:371-375 Mr '61. (MIRA 14:6)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.  
(Polyamides) (Condensation products (Chemistry))

KORSHAK, V.V.; FRUNZE, T.M.; LU I-NAN' [Lu I-nan]

Heterochain polyamides. Part 30: Preparation of mixed polyamides  
by fusion of homopolymers with salts. Vysokom.sped 3 no.5:665-670  
My '61. (MIRA 14:5)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.  
(Polyamides)

KORSHAK, V.V.; VINOGRADOVA, S.V.; FRUNZE, T.M.; LEBEDEVA, A.S.; KURASHEV, V.V.

Heterochain polyesters. Part 31: Role played by the hydrolysis of aromatic dicarboxylic acid chlorides in the process of interfacial polycondensation. Vysokom.sosed. 3 no.7:984-990 J1 '61. (MIRA 14:6)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.  
(Hydrolysis) (Isophthaloyl chloride)  
(Terephthaloyl chloride) (Polymerization)

FRUNZE, T. M.,

PHASE I BOOK EXPLOITATION

SOV/6119

Korshak, Vasilii Vladimirovich, and Tat'yana Mikhaylovna Frunze

Sinteticheskiye geterotsepnnyye poliamidy (Synthetic Hetero-Chain Polyamides). Moscow, Izd-vo AN SSSR, 1962. 523 p. Errata slip inserted. 5000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut elementoorganicheskikh soyedineniy.

Resp. Ed.: S. R. Rafikov, Doctor of Chemical Sciences; Eds.: V. M. Zhulin and I. P. Loskutova; Tech. Ed.: S. G. Tikhomirova.

PURPOSE: This book is intended for scientific research workers, students and teachers at schools of higher technical education, and technicians in the synthetic fiber, paint, plastics, and other industries which produce or utilize polyamides.

COVERAGE: The monograph gives a comprehensive summary of the literature through 1959, and a selection of the more interesting materials published in 1960, on the chemistry and physics of hetero-chain polyamides. Types of polyamides, polymerization, the mechanics of polycondensation, and the chemical and physical

Card 1/5

APPROVED FOR RELEASE: 06/13/2000

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Synthetic Hetero-Chain Polyamides

properties and the production of polyamides are discussed. References are given following each chapter (Chs. VII and VIII each have a bibliography of over 700 items). Altogether about 400 Soviet and 1500 non-Soviet authors are cited. No personalities are mentioned.

TABLE OF CONTENTS [Abridged]:

Foreword	3
Ch. I. Introduction	5
History of the discovery of the individual types of polyamides	5
Classification of polyamides	7
References	12
Ch. II. Production of Polyamides by Polycondensation	13
Types of polyamide-forming reactions	14
Structure and polyamide-forming capacity of monomers	16
Reference data (tables)	24
References	70

Card 2/5

Synthetic Hetero-Chain Polyamides

SOV/6119

Ch. III. Polycondensation Mechanism	78
Polycondensation and its types	78
Equilibrium polycondensation	80
Polycondensation at the phase boundary	127
References	147
Ch. IV. Production of Polyamides by Polymerization	153
Types of polymerization reactions	153
Hydrolytic polymerization	155
Catalytic polymerization of cyclic lactams	180
Decarboxylation polymerization	188
Copolymerization of polyisocyanates with polyhydric alcohols of polyamines	193
Copolymerization of 2,2-bis-5(4,4)-oxazolones with diamines or glycols	207
Polymerization of isocyanates	208
Polymerization of unsaturated amides	210
References	211

Card 3/5

Synthetic Hetero-Chain Polyamides	30V/6119
Ch. V. Production of Mixed Polyamides	217
Equilibrium reactions	217
Nonequilibrium reactions	240
Graft copolymers	243
Block copolymers	254
References	255
Ch. VI. Chemical Properties of Hetero-Chain Polyamides	260
Cleavage of the amide bond	261
Amide substitution by hydrogen radicals	268
Degradation and structure formation	272
Other polyamide reactions	292
Absorption of various substances by polyamides	294
References	298
Ch. VII. Physical Properties of Polyamides	308
References	391

Card 4/5

Synthetic Hetero-Chain Polyamides	SOV/6119
Ch. VIII. Production and Applications of Polyamides	405
References	416
Ch. IX. Various Representative Types of Polyamides	429
References	465
Author Index	468
Subject Index	489

AVAILABLE: Library of Congress

SUBJECT: Chemical Engineering [Chemistry]

Card 5/5

BN/dmp/gm  
1/3/63



FRUNZE, T. M.

PHASE I BOOK EXPLOITATION

SOV/6034

Konferentsiya po khimii i primeneniyu fosfororganicheskikh soyedineniy. 2d, Kazan', 1959.

Khimiya i primeneniye fosfororganicheskikh soyedineniy; trudy (Chemistry and Use of Organophosphorus Compounds; Conference Transactions) Moscow, Izd-vo AN SSSR, 1962. 630 p. Errata slip inserted. 2800 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Kazanskiy filial.

Resp. Ed.: A. Ye. Arbuzov, Academician; Ed. of Publishing House: L. S. Povarov; Tech. Ed.: S. G. Tikhomirova.

PURPOSE: This collection of conference transactions is intended for chemists, process engineers, physiologists, pharmacists, physicians, veterinarians, and agricultural scientists.

COVERAGE: The transactions include the full texts of most of the scientific papers presented at the Second Conference on the Chemistry and Use of

Card 1/3

1/3

43

Chemistry and the Use of Organophosphorus (Cont.)

SOV/6034

Organophosphorus Compounds held at Kazan' from 2 Nov through 1 Dec 1959. . . The material is divided into three sections: Chemistry, containing 67 articles; Physiological Activity of Organophosphorus Compounds, containing 26 articles; and Plant Protection, containing 12 articles. The reports reflect the strong interest of Soviet scientists in the chemistry and application of organophosphorus compounds. References accompany individual reports. Short summaries of some of the listed reports have been made and are given below.

TABLE OF CONTENTS:[Abridged]:

Introduction (Academician A. Ye. Arbuzov)

3

TRANSACTIONS OF THE CHEMISTRY SECTION

Gefter, Ye. L. [NII plastmass (Scientific Research Institute of Plastics, Moscow]. Some Prospects for the Industrial Use of Organophosphorus Compounds

46

Card 2/3

3/3

Chemistry and the Use of Organophosphorus (Cont.)

SOV/6034

Korshak, V. V., T. M. Frunze, V. V. Kurashev, and L. V. Kozlov [Institute of Organoelemental Compounds]. Synthesis of Some Phosphorus-Containing Dicarboxylic Acids and Derivation of Polyamides Based on Such Acids

247

Phosphorus-containing dicarboxylic acids have been obtained by synthesis and used for the preparation of polyamides. The effect of the phosphorus and the structure of the acids on the properties of the polyamides has been studied.

Kolesnikov, G. S., Ye. F. Rodionova, and L. S. Fedorova [Institute of Organoelemental Compounds]. Synthesis, Polymerization, and Copolymerization of Esters of Vinylphosphonic Acid

255

The authors obtained esters of vinylphosphonic acid and demonstrated that these esters are capable of entering the polymerization and copolymerization reaction with other monomers. Polymers and copolymers of the dichloride and esters of vinylphosphonic acid have been synthesized and their properties determined.

Card ~~594~~ 3/3

44417

S/190/62/004/010/001/010  
B101/B186

AUTHORS: Korshak, V. V., Vinogradova, S. V., Frunze, T. M., Kozlov,  
L. V., Wu Pang-yüan

TITLE: Heterochain polymers. XL. Synthesis of polyamide esters by  
interfacial polycondensation

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 10, 1962,  
1457-1462

TEXT: A comparison is made between the properties of polycondensates obtained by interfacial polycondensation (iC) and equilibrium polycondensation (eC) of sebacic chloride (I), diene(4,4'-dihydroxy-diphenyl propane) (II), and hexamethylene diamine (III). Interfacial polycondensation was achieved by mixing 0.2 N alkaline solutions of II and III with I dissolved in hexane, and eC was brought about by heating the component mixture first in  $N_2$  and then in vacuo, the ratio I : II : III being varied between 1 : 1 : 0 and 1 : 0 : 1. Homopolymers could be separated from the reaction product since the homopolymer I + III is insoluble in

Card 1/3

S/190/62/004/010/001/010  
Bf01/B186

Heterochain polymers. XL<sub>1</sub>...

p-xylene, whereas homopolymer I + II is soluble in p-xylene. The nitrogen content of the reaction product soluble in p-xylene confirmed the formation of a polyamide ester.<sup>3</sup> The differences observed between the products obtained by iC and eC are that the product from eC, containing less than 40% III, was better soluble in p-xylene than product from iC containing the same amount of III, whereas the eC products containing more than 40% III were not as easily soluble as the comparable iC products. Furthermore, the softening points of iC products containing less than 40% III were lower than those of the corresponding eC products. The thermomechanical curves of the iC products were flatter. At a component ratio of 1 : 0.5 : 0.5, the nitrogen contents in the insoluble part of the polymer obtained by iC and eC were ~8.7% and ~4.2%, respectively, that in the soluble part being ~1.9% in iC and ~3.6% in eC. Conclusion: I diffuses from the organic into the aqueous phase owing to hydrolysis during iC; III diffuses into the organic phase more readily than II. Hence, the polymer formed from the organic phase should contain amide units, and the product formed from the aqueous phase and should be enriched with ester units. This was confirmed by iC when the mixture was stirred at varying speeds. At a ratio of 6 : 5 : 1 and at 1000 rpm, the

Card 2/3

Heterochain polymers. XL. ...

S/190/62/004/010/001/010  
B101/B186

polymer had a nitrogen content of 7.02% and a softening point of 194°C, at 6000 rpm, the nitrogen content was 2.07% and the softening point was 47°C. At a ratio 1 : 1 : 1, a polymer containing ~8.9% nitrogen was obtained in both cases. Hence, III has a greater reactivity than II. There are 2 figures and 3 tables. The English-language reference is: W. M. Kareckson, J. Polymer Sci., 40, 399, 1959.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy AN SSSR  
(Institute of Elemental Organic Compounds AS USSR)

SUBMITTED: May 19, 1961

Card 3/3

KORSHAK, V.V.; VINOGRADOVA, S.V.; ERUNZE, T.M.; GRIBOVA, I.A.;  
ZHDANOV, A.A.; MOZGOVA, K.K.; KRONGAUZ, Ye.S., red.izd-va;  
TIKHOMIROVA, S.G., tekhn.red.

[Chemistry and technology of synthetic macromolecular compounds.  
Heterocyclic compounds]. Khimiia i tekhnologiya sinteticheskikh  
vysokomolekuliarnykh soedinenii. Soderzhatsepye soedineniia:  
Moskva, Izd-vo Akad.nauk SSSR. 1961. 721 p. (Itogi nauki:  
Khimicheskie nauki, no.7) (MIRA 14:11)

1. Chlen-korrespondent AN SSSR (for Korshak).  
(Macromolecular compounds)  
(Heterocyclic compounds)

KORSHAK, V.V.; FRUNZE, T.M.; VINOGRADOVA, S.V.; KURASHEV, V.V.; LEBEDEVA, A.S.

Role of acid chloride hydrolysis of some aliphatic and aromatic dicarboxylic acids in the process of interfacial polycondensation. Izv. AN SSSR. Otd. khim. nauk no. 10: 1807-1813 O '62. (MIRA 15:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.  
(Acids, Organic) (Chlorides) (Hydrolysis)  
(Polymerization)



42649

S/062/62/000/011/012/021  
B101/B144

15.8080  
AUTHORS:

Korshak, V. V., Frunze, T. M., and Kozlov, L. V.

TITLE:

Heterochain polyamides. Communication 32. Interfacial formation of mixed polyamides from mixtures of various diamines

PERIODICAL:

Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 11, 1962, 2062 - 2069

TEXT: The rules governing the interfacial polycondensation of adipyl chloride (AC) with a mixture of ethylene diamine (I) and m-phenylene diamine (II), or I and hexamethylene diamine (III), were studied. Polyamides were also synthesized from sebacyl chloride (SC) and a mixture of III and piperazine (IV). The polycondensation was carried out at room temperature; the chloride was dissolved in benzene, the diamines in aqueous alkali. The molar ratio of the diamines was varied between 0:1 and 1:0. The relative reaction rate of II and III was determined by acylating their mixture with benzoyl chloride. The nitrogen content of the reaction product and its IR spectrum proved that mainly dibenzoyl hexamethylene amine was formed and that the reaction rate of III was consequently much higher

Card 1/3

Heterochain polyamides...

S/062/62/000/011/012/021  
B101/3144

than that of II. In the polycondensation of AC with diamines the following were determined: the initial ratio  $K_1$  of the diamines, the ratio  $K_2$  of the diamines in the copolymer, and  $\alpha = K_2/K_1$ . The following values were

found:	$K_1 = I/II$	$K_2 = I/II$	$\alpha$	$K_1 = I/III$	$K_2 = I/III$	$\alpha$
	4	0.54	0.14	4	2.03	0.51
	1.50	0.41	0.27	1.50	0.613	0.41
	1.00	0.15	0.15	1.00	0.32	0.48
	0.67	0.18	0.27	0.67	0.32	0.48
	0.25	0.00	0.00	0.25	0.075	0.30
	$\alpha_{\text{mean}} = 0.17$					0.41

The polymers had a higher content of II or III, respectively, than would correspond to the initial ratio. After prolonged polycondensation of AC with I and II, the I content in the polymer increased owing to exhaustion of the diamine mixture with respect to II, which had the principal share in the early reaction stage. The system of SC behaved similarly with III and IV. These results are explained by the different rates of diffusion of

Card 2/3

Heterochain polyamides...

S/062/62/000/011/012/021  
B101/B144

the diamines into the organic phase. It is (in  $M/cm^2 \cdot min$ )  $3.9 \cdot 10^{-7}$  for I,  $6.07 \cdot 10^{-5}$  for II, and  $1.07 \cdot 10^{-5}$  for III. The dissociation constants are  $8.5 \cdot 10^{-5}$ ,  $6.0 \cdot 10^{-10}$ , and  $5.1 \cdot 10^{-4}$ , respectively. In the polymer, the content of radicals of the diamine primarily depends on the rate of diffusion. The reactivity is of secondary importance and has a compensating effect on the polymer composition if the slowly diffusing diamine has a higher reaction rate (dissociation constant). There are 3 figures and 5 tables.

ASSOCIATION: Institut elementoorganicheskikh soedineniy Akademii nauk SSSR  
(Institute of Elemental Organic Compounds of the Academy of Sciences USSR)

SUBMITTED: April 9, 1962

Card 3/3

43462

S/190/62/004/012/001/015  
B101/B186

1012089  
AUTHORS: Korshak, V. V., Frunze, T. M., Krasnyanskaya, E. A.  
TITLE: Heterochain polyamides. XXXI. Effect of the cyclizing capacity of monomers on the polymer chain termination process  
PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 12, 1962, 1761-1769

TEXT: The peculiarities of the polycondensation of succinic acid (I) with hexamethylene diamine (II) were studied. Hexamethylene disuccinimide (III), m.p. 117-118°C, which has not hitherto been described, was synthesized by reaction of 2 moles I with 1 mole II at 200-210°C, or by reaction of the neutral hexamethylene diamine succinate with 1 mole I at 160°C. Poly-hexamethylene diamine succinamide (IV), m.p. 275-280°C, molecular weight 1500-3100, was obtained by reaction of hexamethylene diamine succinate with I at 220°C, or by reaction of III with II at 160-210°C, or by interfacial polycondensation of succinyl chloride, dissolved in benzene, with aqueous alkaline solution of II. Heating of IV to 280°C and above does not yield polymers of a higher molecular weight, but leads to thermal degradation

Card 1/3

Heterochain polyamides. XXXI. Effect...

S/190/62/004/012/001/015  
B101/B186

with liberation of II. A wax-like red substance with m.p. 130°C is formed. This is explained by chain termination owing to formation of succinimide rings at the end of the macromolecule. First the linear polyamide chain breaks, and forms succinimide and amino end-groups; then cyclization occurs with liberation of II. This "cycloimide effect" was confirmed by the fact that the IR spectrum of IV showed the 1780 and 1690  $\text{cm}^{-1}$  bands of the succinimide ring besides the 1690 and 1550  $\text{cm}^{-1}$  bands of the amido groups. Moreover, the content of titrimetrically determinable carboxyl end-groups in the polyamide was, owing to the cyclization, lower than the content of amino end-groups, and the content of COOH groups decreased further with an excess of I. With equimolecular ratio of I and II, the polyamide contained 50% amino end-groups, 5.6% carboxyl groups, and 44.4% cyclic (succinimide) end-groups, whereas the values were 2%, 2%, and 96%, respectively, with an 80% excess of I. The succinimide ring is not stable; it opens on heating, and a linear polyamide is formed. Such formations of five- and six-membered rings are assumed to be a frequent cause of chain termination in the polycondensation of dicarboxylic acids with diamines. It occurs in the polycondensation of succinic and glutaric acid both with hexamethylene diamine and with ethylene diamine and trimethylene diamine. It probably

Card 2/3

Heterochain polyamides. XXXI. Effect...

S/190/62/004/012/001/015  
B101/B186

also affects the polycondensation of adipic acid with diamines, including tetramethylene diamine. There are 2 figures and 3 tables.

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR  
(Institute of Elemental Organic Compounds AS USSR)

SUBMITTED: June 25, 1961

Card 3/3

KORSHAK, V. V.; FRUNZE, T. M.; KOZLOV, L. V.

Heterochain polyamides. Report No. 33: Formation of mixed polyamides at the interface mixtures of various acid chlorides. Izv. AN SSSR Otd. khim. nauk no.12:2226-2235 D '62.  
(MIRA 16:1)

1. Institut elementoorganicheskikh soedineniy AN SSSR.

(Polyamides) (Acids, Organic)  
(Condensation products(Chemistry))

KORSHAK, V.V., FRUNZE, T.M., KURASHEV, V.V.

The synthesis of phosphorus-containing dicarbonic acids.

Report presented for the 12th Conference on high molecular weight compounds devoted to monomers, Baku, 3-7 April 62



IZYNEYEV, A.A.; KORSHAK, V.V.; FRUNZE, T.M.; KURASHEV, V.V.

Preparation of polymers by polycyclization. Report No.2: Study  
of the formation of polybenzimidazoles. Izv. AN SSSR Ser.khim.  
no.10:1828-1836 0 '63. (MIRA 17:3)

1. Institut elementoorganicheskikh soedineniy AN SSSR.

4

IZYNEYEV, A.A.; KORSHAK, V.V.; FRUNZE, T.M.; ALDAROVA, N.Sh.; KURASHEV, V.V.

Preparation of polymers by polycyclization reaction. Report  
No.3: Properties of polybenzimidazole obtained from 3,3-diamino-  
benzidine and diphenyl ester of sebacic acid. Izv. AN SSSR. Ser.  
khim. no.11:2019-2023 N '63. (MIRA 17:1)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.

L 13716-63

EWf(1)/BDS/EWT(m) ASD. Pc-4 RM

ACCESSION NR: AP3003786

8/0190/63/005/007/0979/0985

AUTHOR: Korshak, V. V.; Frunze, T. M.; Khrashev, V. V.; Kotrelev, G. V. 62  
61

TITLE: Heterochain polyamides. 34. Synthesis of polyamides with active functional groups in macromolecules

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 5, no. 7, 1963, 979-985

TOPIC TAGS: polyamides, polycondensation, interfacial polycondensation, macromolecules, functional groups

ABSTRACT: Studies were conducted on the polycondensation reaction of 1,3-diaminopropane-2-ol<sup>1</sup> (DAPO) with sebacic acid as well as with sebacyl and terephthalyl chlorides. The polyamide obtained by heating a mixture of DAPO with sebacic acid for one hour at not over 200C yielded a product of low molecular weight. Any further increase in temperature or heating time resulted in the formation of a tridimensional, nonfusible, brittle mass, soluble only in sulfuric acid. On the other hand, interfacial polycondensation of DAPO with sebacyl or terephthalyl chlorides in a water-benzene system produced cresol-soluble polymers of substantially higher viscosity, the optimum concentration

Card 1/2

L 13716-63

ACCESSION NR: AP3003786

of DAPO being 0.25 Molar. An excess of DAPO is needed, since it acts as an acceptor for the hydrogen chloride formed during the reaction. The optimal yield of the polymer amounted to 80%, as against 63% where sodium hydroxide was used as acceptor. Mixed polyamides were produced by reacting DAPO with sebacyl chloride and hexamethylenediamine. Here, too, the use of sodium hydroxide resulted in products of a higher melting point and lower solubility. Orig. art. has: 6 diagrams and 3 tables.

ASSOCIATION: Institut elementoorganicheskikh sovedineniy AN SSSR (Institute of Elementoorganic Compounds, AS USSR)

SUBMITTED: 06Dec61

DATE ACQ: 08Aug63

ENCL: 00

SUB CODE: 00

NO REF SOV: 005

OTHER: 001

Card 2/2

KORSHAK, V.V.; FRUNZE, T.M.; PAVLOVA, S.A.; KURASHEV, V.V.

Heterochain polyamides. Part 35: Change in the rate of interfacial condensation and of fractional composition of polyhexamethylenedipamide. Vysokom.sped. 5 no.8:1130-1134 Ag '63. (MIRA 16:9)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.  
(Adipamide) (Polymerization)

MEDVED', T.Ia.; FRUNZE, T.M.; KHU CHIN-MEY; KURASHEV, V.V.; KORSHAK, V.V.;  
KABACHNIK, M.I.

Organophosphorus polyamides based on methyldi-(m-aminophenyl)phosphine oxide. Vysokom.soed. 5 no.9:1309-1314 S '63. (MIRA 17:1)

1. Institut elementoorganicheskikh soedineniy AN SSSR.

KORSAHK, V.V.; FRUNZE, T.M.; KURASHEV, V.V.; IZYNEYEV, A.A.

Reactions involved in the formation of polybenzimidazoles.

Dokl.AN SSSR 149 no.1:104-106 Apr '63. (MIRA 16:2)

1. Institut elementoorganicheskikh soedineniy AN SSSR.
2. Chlen-korrespondent AN SSSR (for Korshak).  
(Benzimidazole) (Polymerization)

ACCESSION NR: AP4037285

S/0190/64/006/005/0901/0905

AUTHORS: Korshak, V. V.; Frunze, T. M.; Izy\*neyev, A. A.; Shishkina, T. N.

TITLE: Synthesis of polymers by the polycyclization reaction. 4. Synthesis of mixed polyamidobenzimidazoles from 3,3'-diaminobenzidine, hexamethylenediamine, and diphenylsebacate

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 5, 1964, 901-905

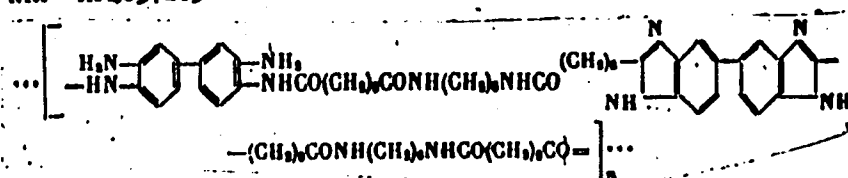
TOPIC TAGS: polymer polycyclization reaction, mixed polyamidobenzimidazole, diaminobenzidine hexamethylenediamine diphenylsebacate, polyamidization reaction

ABSTRACT: The polycondensation of 3,3'-diaminobenzidine (DAB), hexamethylene-diamine (HMD) and diphenylsebacate (DPS) was conducted in a current of nitrogen, and the products were heated in a 1 mm vacuum and a  $10^{-3}$  vacuum. The properties of the obtained mixed polyamidobenzimidazoles varied, depending on the ratio of the issuing materials, the temperature, and the duration of the polymerisation reaction, but all of them contained blocks of the structure.

Card 1/3



ACCESSION NR: AP4037285



in their macromolecules. The yield of the copolymers was large and represented dark-brown, glassy material fully soluble in cold tricresol. It was found that at a 4-hour polycondensation at 250C the adjusted viscosity of 0.5% solution of the polymer (in formic acid) was 1.74, while at 270C it was 2.34. An additional 2 hours of reaction time in deep vacuum raised the adjusted viscosities of the same samples to 4.30 and 6.30 respectively. The obtained copolymers were of a medium crystalline state, their crystallinity increasing with a higher percentage of HMD. The softening temperature of the polymer depended on its composition, with a minimum occurring at 164C and at a DAB:HMD ratio of 0.2:0.8. The crystalline structure was determined at the Laboratory of X-ray Analysis of the Institute of Elemento-organic Compounds, and the thermomechanical properties were determined in the Laboratory of Polymer Investigations of the same Institute. Orig. art. has: 3 tables, 4 charts, and 4 formulas.

Card 2/3

ACCESSION NR: AP4037285

ASSOCIATION: Institut elementoorganicheskikh sovedinaniy AN SSSR (Institute of  
Organoelemental Compounds AN SSSR)

SUBMITTED: 21Jun63

DATE ACQ: 09Jun64

ENCL: 00

SUB CODE: MT, OC

NO REF SOV: 002

OTHER: 001

Card 3/3

ACCESSION NR: AP4042186

S/0190/64/006/007/1251/1255

AUTHOR: Korshak, V. V.; Frunze, T. M.; Kurashev, V. V.;  
Lopatina, G. P.

TITLE: Synthesis of certain polybenzimidazoles with a single or mixed single component, and study of their properties

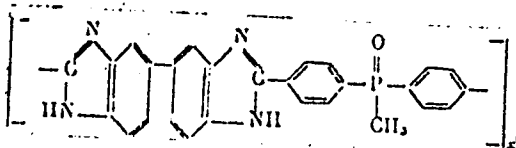
SOURCE: Vyssokomolekulyarnyye soyedineniya, v. 6, no. 7, 1964, 1251-1255

TOPIC TAGS: copolymer, polybenzimidazole, infusible copolymer, insoluble copolymer, heat resistant copolymer

ABSTRACT: New polybenzimidazoles with a single or mixed second component have been synthesized, and their properties have been studied. These organic copolymers have an unusually high heat resistance. Polybenzimidazoles with a single second component were prepared by polycondensation of 3,3'-diaminobenzidine (DAB) with diphenyl esters of isophthalic acid, terephthalic acid, or bis(p-carboxyphenyl)methylphosphine. The first two polybenzimidazoles proved to be infusible and insoluble. The P-containing polybenzimidazole

Card 1/4

ACCESSION NR: AP4042186



is also infusible, but dissolves in formic and sulfuric acids. An attempt to synthesize an F-containing copolymer by polycondensation of DAB with the diphenyl ester of perfluoroterephthalic acid failed as a result of the decomposition of the polycondensation product. The thermomechanical curves of the synthesized products are given in Fig. 1a of the Enclosure. Polybenzimidazoles with a mixed second component were prepared from DAB and mixtures of diphenyl esters of 1) terephthalic and isophthalic acids, 2) sebacic and isophthalic acids, and 3) sebacic and terephthalic acids. The thermomechanical curves of some of the products are given in Fig. 1b. Polybenzimidazoles containing mixed aromatic second components are infusible and are soluble only with difficulty; their solubility depends on the composition of the initial mixture. Polybenzimidazoles containing both aromatic and aliphatic groups exhibit a better solubility, which increases with an increase in aliphatic component content. Orig. art. has: 1 figure and 4 tables.

Card

ACCESSION NR: AP4042186

ASSOCIATION: Institut elementoorganicheskikh soyedineniy AN SSSR  
(Institute of Organoelemental Compounds, AN SSSR)

SUBMITTED: 25Jul63

ATD PRESS: 3054

ENCL: 01

SUB CODE: OC

NO REF SOV: 001

OTHER: 004

Card 3/4

ACCESSION NR: AP4042186

ENCLOSURE: 01

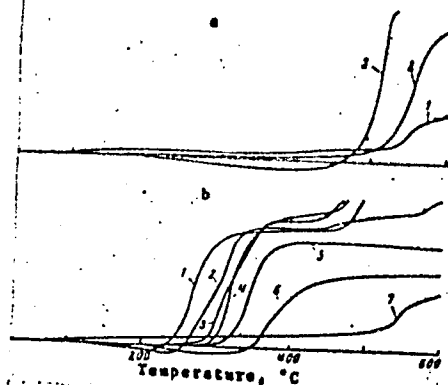


Fig. 1. Thermomechanical properties of:  
a) polybenzimidazoles prepared from 3,3'-diaminobenzidine and diphenyl esters of isophthalic (1) and terephthalic (2) acids or bis(-p-carboxyphenyl)methylphosphine oxide (3); b) polybenzimidazoles, prepared from 3,3'-diaminobenzidine and diphenyl esters of sebacic and terephthalic acids

Molar ratio of diphenyl ester of sebacic acid to diphenyl ester of isophthalic acid:  
1 - 1.0:0.0; 2 - 0.8:0.2; 3 - 0.6:0.4;  
4 - 0.5:0.5; 5 - 0.4:0.6; 6 - 0.2:0.8;  
7 - 0.0:1.0.

4/4

Card

KORSHAK, V.V.; MANUCHAROVA, I.F.; FRUNZE, T.M.; KURASHEV, V.V.

Thermal stability of some homogeneous and mixed polybenzimidazoles  
studied by the differential thermal analysis method. Vysokom.sped.  
6 no.8:1394-1397 Ag '64. (MIRA 17:10)

1. Institut elementoorganicheskikh soedineniy AN SSSR i Institut  
obshchey i neorganicheskoy khimii imeni Kurnakova AN SSSR.

L 22658-65

EPF(C)/EPR/EPA(s)-2/ETP(j)/ENT(m)/T Pc-4/Pr-4/ps-4/Pt-10 JAJ/RM/WK/MLK

ACCESSION NR: AT5002111

S/0000/64/000/000/0063/0066

AUTHOR: Korshak, V. V.; Frunze, T. M.; Kurashov, V. V.; Medved', T. Ya.; Polikarpov, Yu. M.; Hu, Ch'ing-mei; Kabachnik, M. I.

TITLE: Synthesis of certain phosphorus-containing monomers

SOURCE: AN SSSR. Institut neftekhimicheskogo sinteza, Sintez i svoystva monomerov (The synthesis and properties of monomers). Moscow, Izd-vo Nauka, 1964, 63-66

TOPIC TAGS: polyamide, aromatic dicarboxylic acid, aromatic diamine, organophosphorus compound, polycondensation, aliphatic diamine, phosphine derivative

ABSTRACT: The authors synthesized a series of phosphorus-containing bifunctional monomers of the type of aromatic dicarboxylic acids or amines, e.g. the oxides of phenyl- and methyldi-(m-carboxyphenyl)-phosphine and of phenyl- and methyldi-(m-aminophenyl)-phosphine. The monomers were then utilized for the synthesis of polyamides by the methods of equilibrium and inter-phase polycondensation. A large number of polyamides were obtained from the phosphorus-containing dicarboxylic acids with aliphatic and aromatic diamines as well as from the phosphorus-containing diamines with certain dicarboxylic acids. All the polyamides were capable of fiber- and film-formation. In their mechanical properties, the polyamides were comparable to polymers of the type of polyhexamethylenediamine

Card 1/2



L 22658-65

ACCESSION NR: AT6002111

or polyhexamethylsebacamide. The polyamides containing phosphorus showed good flame resistance. In addition, they can be used for the same applications as ordinary polyamides. Orig. art. has: 3 tables and 5 formulas.

ASSOCIATION: None

SUBMITTED: 30Jul64

ENCL: 00

SUB CODE: OC, GC

NO REF SOV: 005

OTHER: 006

Card 2/2

KORSHAK, V.V.; FRUNZE, T.M.; KURASHEV, V.V.; LOPATINA, G.P.

Synthesis and properties of some homogeneous and mixed poly-  
benzimidazoles. Vysokom. soed. 6 no.7:1251-1255 J1 '64  
(MIRA 18:2)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.

L 17635-65 EPA(s)-2/EWT(m)/EPF(c)/EPR/ENP(j)/T Pc-4/Pr-4/Ps-4/Pt-10 RPL/  
ASD(a)-5/AFWL/ESD(dp)/ESD(t) HW/RM

ACCESSION NR: AP5000916

S/0020/64/159/004/0843/0846

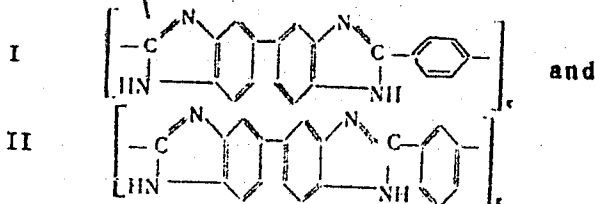
AUTHOR: Kasatochkin, V. I.; Korshak, V. V. (Corresponding member AN SSSR);  
Kurashev, V. V.; Smutkina, Z. S.; Frunze, T. M.; Khrenkova, T. M.

TITLE: Some properties of polybenzimidazoles

SOURCE: AN SSSR. Doklady, v. 159, no. 4, 1964, 843-846, and insert facing p. 844

TOPIC TAGS: polybenzimidazole, heat resistant polymer, organic semiconductor,  
semiconductor polymer

ABSTRACT: The results of a comparative investigation of the structure and proper-  
ties of polymers obtained by polycondensation of 3,3'-diaminobenzidine and diphenyl  
esters of terephthalic or isophthalic acids are reported. The polycondensation was  
conducted under vacuum at up to 380C for 3 1/2 hr. Polybenzimidazoles with the  
structure



Card 1/3

L 17655-65

ACCESSION NR: AP5000916

4  
were obtained. The polymers had high thermal stability, i.e., basic changes in the elemental composition of both polymers took place at 550C along with a considerable increase in the evolution of volatile products; they also have semiconducting properties displaying a negative temperature coefficient of resistivity. Polymer I differs from Polymer II, in that it has a somewhat higher thermal stability and a crystalline structure. The x-ray diffraction patterns, taken at elevated temperatures, indicate that at up to 500C the initial structure of polymers (crystalline in Polymer I and amorphous in Polymer II) remains intact. The IR spectra at up to 500C indicate, by retaining all basic absorption bands, that the molecular chains are preserved. The extensive changes taking place in the x-ray diffraction patterns and IR spectra at up to 800C indicate a complete change in the initial structure accompanied by the progressive inclusion of flat layers of aromatically bound carbon. It appears that the imidazole groups undergo thermal destruction and crosslinking of molecular chains before the phenylene groups do. Orig. art. has: 2 formulas, 3 figures, and 1 table.

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR (Institute of Organoelemental Compounds, AN SSSR); Institut goryuchikh iskopayemykh Gosudarstvennogo komiteta po toplivnoy promyshlennosti pri Gosplane SSSR (Mineral Fuel Institute of the State Committee for the Fuel Industry at the Gosplan, SSSR)

Card 2/3

L 17655-65

ACCESSION NR: AP5000916

SUBMITTED: 14Jul64

ENCL: 00

0  
SUB CODE: OC, GC

NO REF SOV: 002

OTHER: 003

ATD PRESS: 3152

Card 3/3

ACCESSION NR: AP4043775

S/0190/64/006/008/1394/1397

AUTHOR: Korshak, V. V., Manucharova, I. F., Frunze, T. M., Kurashev, V. V.

TITLE: Investigation of the thermal stability of some homogeneous and mixed polybenzimidazoles by the method of differential thermal analysis

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 8, 1964, 1394-1397

TOPIC TAGS: thermal stability, polybenzimidazole, differential thermal analysis, mixed polymer, thermogram

ABSTRACT: Using the gravimetric method described in an earlier paper, the authors investigated the thermal stability of ten polybenzimidazoles prepared from 3,3'-diaminobenzidine and the diphenylesters of either bis-(p-carboxyphenyl) methylphosphine oxide or terephthalic, isophthalic and sebacic acid. The weight loss of the polymers, heated in a stream of nitrogen to 550, 600 and 650C, the temperature of incipient decomposition and the temperature of steep weight loss are tabulated. As shown by Fig. 1. in the Enclosure, all these polymers, especially those of homogeneous composition, exhibited a high degree of thermal resistance, showing the first signs of decomposition at temperatures between 400 and 520C. The relationships between thermal behavior and polymer composition are

Card 1/3

ACCESSION NR: AP4043775

discussed at length. Orig. art. has: 1 table and 2 figures.

ASSOCIATION: Affiliation: Institut elementoorganicheskikh soedineniy AN SSSR (Institute of Organometallic Compounds, AN SSSR); Institut obshchey i neorganicheskoy khimii imeni Kurnakova AN SSSR (Institute of General and Inorganic Chemistry, AN SSSR)

SUBMITTED: 25Jul63

ENCL: 01

SUB CODE: OC

NO REF SOV: 003

OTHER: 001

Card 2/3

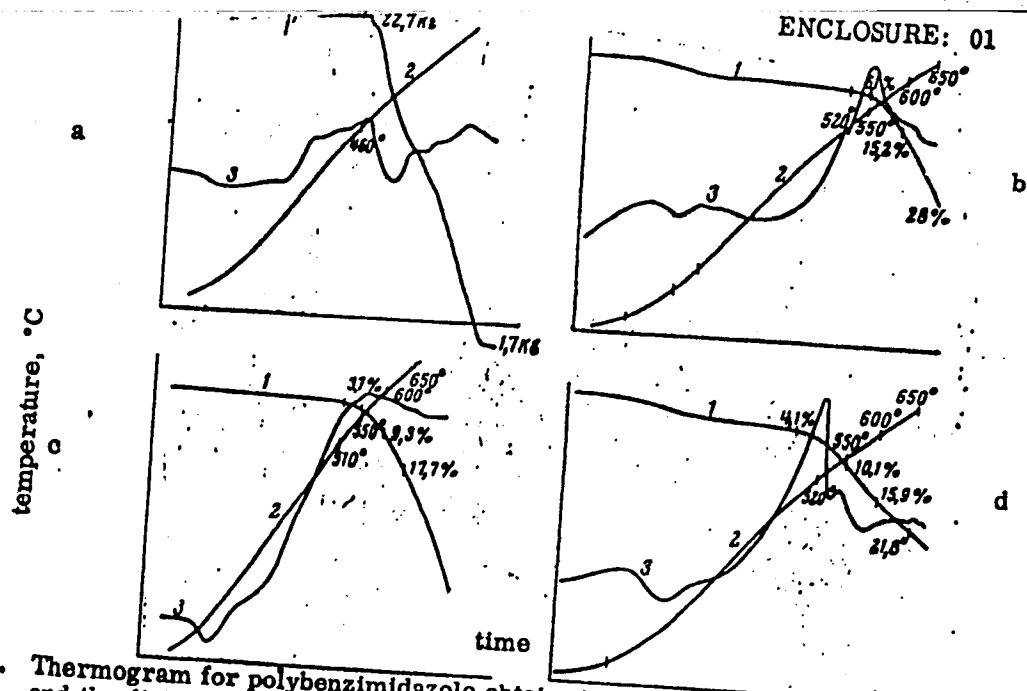


Fig. 1. Thermogram for polybenzimidazole obtained from 3,3'-diaminobenzidine and the diphenyl ester of: a. sebacic acid; b. isophthalic acid; c. terephthalic acid; d. bis-(p-carboxyphenyl)-methylphosphine oxide.



L 18296-65 EPA(s)-2/EWT(m)/EPF(c)/EPR/ENP(j)/T Pc-L/Pr-L/Ps-L/Pt-10 RPL  
RM/WW

ACCESSION NR: AP5000491

S/0062/64/000/011/2104/2106

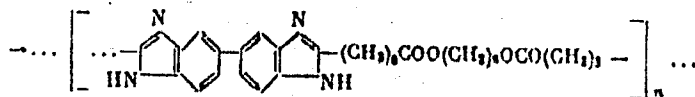
AUTHOR: Korshak, V. V.; Frunze, T. M.; Izy\*neyev, A. A.

TITLE: Use of the polycyclization reactions for the synthesis of copolymers containing benzimidazole, ester, and amide groups B

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 11, 1964, 2104-2106

TOPIC TAGS: polyesterification, polycyclization, copolymer, mixed copolymer

ABSTRACT: Polyesterification and polycyclization have been used simultaneously for the preparation of poly(benzimidazole ester) (I) and poly(benzimidazole amide) (II). Copolymer I



was synthesized from 3,3'-diaminobenzidine, 1,6-hexanediol, and diphenyl sebacate under conditions described in an earlier study

Card 1/3

L 18296-65

ACCESSION NR: AP5000491

(Vysokomolekulyarnyye soyedineniya, no. 5, 1964, 901-905). Copolymer I is a yellowish-green glassy amorphous product, insoluble in a number of organic solvents and partly soluble in hot concentrated sulfuric acid. Its structure was confirmed by elemental analysis. Copolymers II were synthesized from bis(3,4-diaminophenyl)methane, 1,6-hexanediamine, and diphenyl sebacate. Copolymers II are dark-brown glassy products. X-ray patterns indicate that the degree of crystallinity of copolymers II increases with an increase in the polyamide content. Elemental analysis indicates that the chains of copolymer II contain imidazole, amide, and amine groups. The thermomechanical curves of copolymers I and II are given in Fig. 1 of the Enclosure. Orig. art. has: 2 figures.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy AN SSSR  
(Institute of Organoelemental Compounds, AN SSSR)

SUBMITTED: 18Apr64

ENCL: 01

SUB CODE: OC,GC

NO REF SOV: 002

OTHER: 000

ATD PRESS: 3156

Card 2/3

L 18296-65

ACCESSION NR: AP5000491

ENCLOSURE: 01

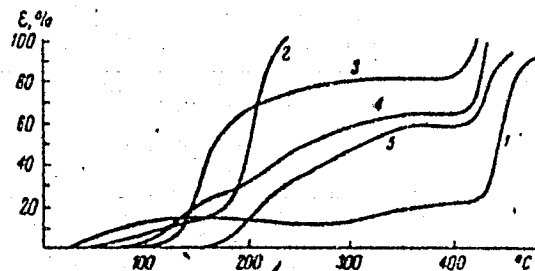


Fig. 1. Thermomechanical curves of copolymers I and II

1 - Poly(benzimidazole ester), prepared from 3,3'-diaminobenzidine, 1,6-hexanediol, and sebacic acid in a 1/1/2 ratio; 2, 3, 4, 5 - poly(benzimidazole amide) prepared from bis(3,4-diaminophenyl)methane, 1,6-hexanediamine, and diphenyl sebacate; tetramine/diamine ratios:  
2 - 0.2/0.8; 3 - 0.4/0.6; 4 - 0.6/0.4; 5 - 0.8/0.2.

Card 3/3

L 40977-65 EWT(m)/EPF(c)/EWP(j)/EWA(c) Pc-4/Pr-4 RM  
ACCESSION NR: AP5006421

S/0062/65/000/001/0184/0187

AUTHOR: Larina, L. P.; Izyneyev, A. A.; Frunze, T. M.

TITLE: Investigation of the ultraviolet spectra of certain new polybenzimidazoles and of model compounds of the benzimidazole series

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 1, 1965, 184-187

TOPIC TAGS: spectrum analysis, ultraviolet absorption, ultraviolet spectrum, benzimidazole

ABSTRACT: The ultraviolet spectra of certain new polybenzimidazoles containing residues of aromatic and aliphatic dicarbonic acids and the UV-spectra of standard compounds of them were investigated. The solvents used included water, methanol, ethanol, and sulfuric acid. Orig. art. has: 1 table, 3 figures.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elementoorganic Compounds, Academy of Sciences SSSR)

Card 1/2

L 40977-65

ACCESSION NR: AP5006421

SUBMITTED: 02Jun64

ENCL: 00

SUB CODE: GC, OC

NO REF SOV: 004

OTHER: 003

*22c*  
Card 2/2

L 54629-65 EWT(m)/EPF(c)/EPR/EWP(j)/T

ACCESSION NR: AP5010915

Pc-4/Pr-4/Ps-4 RPL WH/RM  
UR/0286/65/000/007/0102/0102

AUTHOR: Korshak, V. V.; Kogan, A. M.; Frunze, T. M.; Sergeyev, V. A.;  
Karashev, V. V.; Shleyfman, R. B.; Danilevskaya, L. B.

TITLE: A method of obtaining styrene- $\epsilon$ -caprolactam copolymers.  
Class 39, No. 169782

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 7, 1965, 102

TOPIC TAGS: copolymer, styrene caprolactam copolymer, polymerization catalyst, caprolactam

ABSTRACT: This method of forming copolymers of  $\epsilon$ -caprolactam and styrene by copolymerization of the corresponding monomers in the presence of N-acryloylcaprolactams is characterized by the use of  $\epsilon$ -caprolactam as solvent, and the use of anionic catalysts or a mixture of anionic and free radical catalysts. The two types of catalysts are added either simultaneously or sequentially. This procedure enhances formation of graft copolymers with desirable properties. A mixture of the sodium derivative of caprolactam and N-acylamide co-catalyst, containing unsaturated substituents, can be used as the anionic catalyst.

Card 1/2 [VS]

L 54629-65

ACCESSION NR: AP5010915

ASSOCIATION: none

SUBMITTED: 07Mar64

NO REF SOV: 000

ENCL: 00

SUB CODE: OC, GC

OTHER: 000

ATD PRESS: 3231

Card *AR* 2/2

L 8152-66 EWT(m)/EWP(j)/T RPL WW/RM

ACC NR: AP5027689

SOURCE CODE: UR/0062/65/000/010/1860/1866

AUTHOR: Baranov, Ye. L.<sup>44.55</sup>; Frunze, T. M.<sup>44.55</sup>; Kurashev, V. V.<sup>44.55</sup>

ORG: Institute of Organo-elemental Compounds, Academy of Sciences SSSR  
(Institut elementoorganicheskikh sovedineniy Akademii nauk SSSR)

TITLE: Graft copolymerization<sup>744.55</sup> of styrene<sup>7</sup> with epsilon-caprolactam<sup>7</sup>  
in bulk

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 10, 1965,  
1860-1866

TOPIC TAGS: copolymerization, polymerization rate, polymerization  
kinetics, block copolymer, radical polymerization, catalytic  
polymerization

ABSTRACT: Two stage graft copolymerization of epsilon-caprolactam with  
styrene to form copolymers containing 5-50% styrene was studied.  
Radical copolymerization of styrene with N-methacryloylcaprolactam in  
epsilon-caprolactam solution to form the macromolecular initiator is  
effected in the first stage. Epsilon-caprolactam is grafted onto the  
macromolecular initiator in the second stage upon addition of  
sodium-caprolactam as the second component of the catalyst system. In  
order to increase the amount of styrene in the graft copolymer the

Card 1/2

UDC: 542.952

072 0240



ACC NR: AP5027689

amount of the catalyst system must be increased proportionally; 0.2 mol% of catalyst is optimum for polymerization of the caprolactam alone. Copolymers formed using less catalyst have large (over 10%) amounts of water-soluble products. The graft copolymers are insoluble cross-linked products which swell in cresol and concentrated sulfuric acid. The reaction mechanism of the cross-link formation is to be reported later. Orig. art. has: 4 figures, 3 tables and 1 equation.

SUB CODE: MT, OC, GC/ SUBM DATE: 23Feb65/ ORIG REF: 000/ OTH REF: 008

nw

Card 2/2

L 35486-65 EWT(m)/EPF(c)/EWP(j)/EWA(c) Pc-4/Pr-4 RPL JW/RM

ACCESSION NR: AP5005595

S/0190/65/007/002/0280/0284

AUTHORS: Frunze, T. M.; Korshak, V. V.; Izyneyev, A. A.

TITLE: Polybenzimidazoles from 3,3',4,4'-tetraminodiphenylmethane

SOURCE: Vysokomolekulyarnyye soyedineniya, v. 7, no. 2, 1965, 280-284

TOPIC TAGS: benzimidazole, methane

ABSTRACT: Polybenzimidazoles were synthesized from 3,3',4,4'-tetraminodiphenylmethane and diphenyl esters of adipic, sebacic, isophthalic, and terephthalic acids. The method of synthesis was described by A. A. Izyneyev, V. V. Korshak, T. M. Frunze, and V. V. Kurashov (Izv. AN SSSR, Ser. khimich., 1963, 1828). These polybenzimidazoles dissolve on heating in tricresol and dimethyl-formamide, and are especially soluble in glacial acetic acid and benzyl alcohol. The introduction of the methylene group between the benzimidazole rings leads to an increase in solubility of the polybenzimidazoles. The thermal stability remains practically unchanged. These polybenzimidazoles, containing aliphatic links, have greater solubility than polybenzimidazoles containing aromatic acid groups. Orig. art. has: 1 figure and 3 tables.

Card 1/2

L 35486-65

ACCESSION NR: AP5005595

ASSOCIATION: Institut elementoorganicheskikh sovedineniy AN SSSR (Institute of  
Hetero-Organic Compounds, AN SSSR)

SUBMITTED: 17Apr64

ENCL: 00

SUB CODE: 00

NO REF SOV: 003

OTHER: 004

Card 2/2

L 35473-65 EPA(s)-2/EWT(w)/EPF(o)/EPR/EWP(j)/T/ENA(c) Pz-4/Pz-4/Pz-4/Pz-10/ RPL  
ACCESSION NR: AP5005596 WJ/JW/RM S/0190/65/007/002/0285/0289

AUTHORS: Frunze, T. M.; Korshak, V. V.; Izmayev, A. A.; Kurashev, V. V. B  
E  
B

TITLE: Synthesis of some polybenzimidazoles containing phosphorus, boron, and oxygen in the chain

SOURCE: Vysokomolekulyarnyye soyedineniya, v. 7, no. 2, 1965, 285-289

TOPIC TAGS: benzimidazole, phosphorus, boron, oxygen, polymer property

ABSTRACT: The authors' purpose in making this synthesis was to obtain such polybenzimidazoles with heteroatoms in the principal chain in order to study the effect of these atoms on the properties of the polybenzimidazoles. They began with 3,3'-diaminobenzidine, 3,3',4,4'-tetraaminodiphenylmethane, 4,4'-dicarboxydiphenyl ether, diphenyl ester, and bis-(n-carboxyphenyl) methylphosphine oxide, in addition to 1,4-phenylenediboric acid tetrabutyl ester. The polymers were obtained by heating these initial reagents one-half hour at 220-260C, then for 5 hours with gradual increase in temperature from 260 to 320-350C and at a residual pressure of  $10^{-3}$  mm. Studies were then made of the viscosity, x-ray powder photographs, softening temperature under a layer of paraffin, solubility in various

Card 1/2

L 35473-65

ACCESSION NR: AP5005596

15  
2  
solvents, and thermal stability. The data are tabulated in the paper. The authors show that all the synthesized polymers are highly stable thermally and are more soluble than similar polybenzimidazoles not containing such heteroatoms. Orig. art. has: 2 tables.

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR (Institute of Hetero-Organic Compounds, AN SSSR)

SUBMITTED: 17Apr64

ENCL: 00

SUB CODE: 00, 00

NO REF SOV: 006

OTHER: 004

Card 2/2

L 62618-65 EPA(s)-2/ENT(m)/EPF(c)/EWP(j)/T Pc-4/Pr-4/Ps-4/Pt-7 WW/RM

ACCESSION NR: AP5018425

UR/0190/65/007/007/1147/1153  
678.01:53+678.67

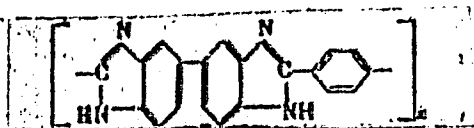
AUTHOR: Kasatochkin, V. I.; Korshak, V. V.; Kurashev, V. V.; Smutkina, Z. S.;  
Frunze, T. M.; Khrenkova, T. M.

TITLE: Study of the structure and thermal stability of certain polybenzimidazoles

SOURCE: Vysokomolekulyarnyye soyedineniya, v. 7, no. 7, 1965, 1147-1153

TOPIC TAGS: polybenzimidazole, organic semiconductor, semiconducting polymer, heat resistant polymer

ABSTRACT: A comparative study has been made of the chemical structure, morphology, thermal stability, and electrical properties of polybenzimidazoles prepared from 3, 3'-diaminobenzidine and terephthalic acid (polymer I) or isophthalic acid (polymer II):



(I)

Card 1/3

L 62618-65

ACCESSION NR: AP5018425



(II)

The polymers were prepared by heating the reactants for 3—5 hr to 380C at  $4 \times 10^{-2}$  mm Hg with subsequent heat treatment of the products at 450—800C. It was found that the polymers had high thermal stability, with decomposition setting in only at above 550C. Polymer I was more thermally stable than polymer II. Both polymers were high-ohmic semiconductors. For example, polymers I and II, nonheat-treated or heat-treated at up to 600C, had resistivities of the order of  $10^{13}$ — $10^8$  ohm·cm and activation energies for conduction from 1.2 to 0.56 ev. Unlike polymer II, polymer I showed a significant change in structure and electrical properties only at temperatures above 500C. Orig. art. has: 4 figures, 2 tables, and 2 formulas. [SM]

ASSOCIATION: Institut elementoorganicheskikh soyedineniy AN SSSR (Institute of Organoelemental Compounds, AN SSSR)

Card 2/3

L 62618-65

ACCESSION NR: AP5018425

SUBMITTED: 14Jul64

ENCL: 00

SUB CODE: OC, GC

NO REF SOV: 003

OTHER: 005

ATD PRESS: 4058

*llc*  
Card 3/3



KORSHAK, V.V.; FRUNZE, T.M.; KURASHEV, V.V.; BAFANOV, Ye.L.

Preparation of graft styrene copolymers with caprolactam.  
Dokl. AN SSSR 160 no.2:349-351 Ja '65.

(MIRA 18:2)

1. Institut elementoorganicheskikh soedineniy AN SSSR.
2. Chlen-korrespondent AN SSSR (for Korshak).

L 16507-66 FWT(m)/EWP(j)/T WW/RM

ACC NR: AP6001490

(A)

SOURCE CODE: UR/0191/65/000/012/0003/0006

AUTHORS: Korshak, V. V.; Frunze, T. M.; Kurashov, V. V.; Baranov, Ye. L.

ORG: none

TITLE: Synthesis of graft copolymers of styrene with  $\epsilon$ -caprolactam in bulk by two-stage polymerization

31  
30  
B

SOURCE: Plasticheskiye massy, no. 12, 1965, 3-6

TOPIC TAGS: graft copolymer, copolymerization, catalytic polymerization

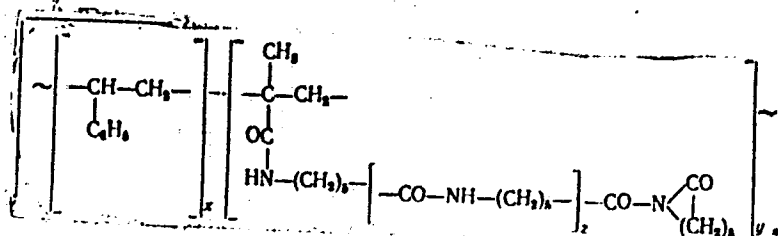
ABSTRACT: A method for synthesizing of graft polymers of styrene with  $\epsilon$ -caprolactam is described. The method consists of consecutively treating the reaction mixture with polymerization catalysts of anionic and radical character. In the first stage of the process styrene is copolymerized with N-methacryloylcaprolactam (catalytic amounts) in  $\epsilon$ -caprolactam solution, using a radical type initiator (e.g., benzoyl peroxide). The second stage is initiated by addition of sodium. The graft copolymer has the structure:

Card 1/2

UDC: 678.675'126-134.622

L 16507-66

ACC NR: AP6001190



Physical and mechanical properties of the copolymers obtained by varying the ratio of starting materials and the concentration of the catalytic system (sodium caprolactam and N-methacryloylcaprolactam) have been investigated. The authors express their gratitude to co-workers from VNITTUglemash for physical and mechanical testing of the copolymer samples. Orig. art. has: 3 tables, 2 figures, and 3 structures.

SUB CODE: 07/

SUBM DATE: none/

ORIG REF: 002/

OTH REF: 006

Card 2/2 SM

L 15339-66 EWT(m)/EWP(j)/T/ETC(m)-6 WW/RM

ACC NR: AP6000977

(A)

SOURCE CODE: UR/0286/65/000/022/0058/0058

AUTHORS: Korshak, V. V.; Frunze, T. M.; Surikova, M. A.

ORG: none

TITLE: A method for obtaining thermostable soluble polymers. Class 39, No. 176398

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 22, 1965, 58

TOPIC TAGS: polyester, polymer, polycondensation, aliphatic dicarboxylic acid, amine

ABSTRACT: This Author Certificate presents a method for obtaining thermostable soluble polymers by polycondensation of aromatic and aliphatic esters of dicarboxylic acid with tetramines. To increase the variety of thermostable soluble polymers, 3,3', 4,4'-tetraminodiphenyl oxide is used as the tetramine.

SUB CODE: 11/ SUBM DATE: 08Jun63

07/

CC  
Card 1/1

UDC: 678.744.34-134.52